

FILMS AND NEWTONIAN LAWS. A BRAIN TOOL FOR LEARNING PHYSICS.

AUTHORS

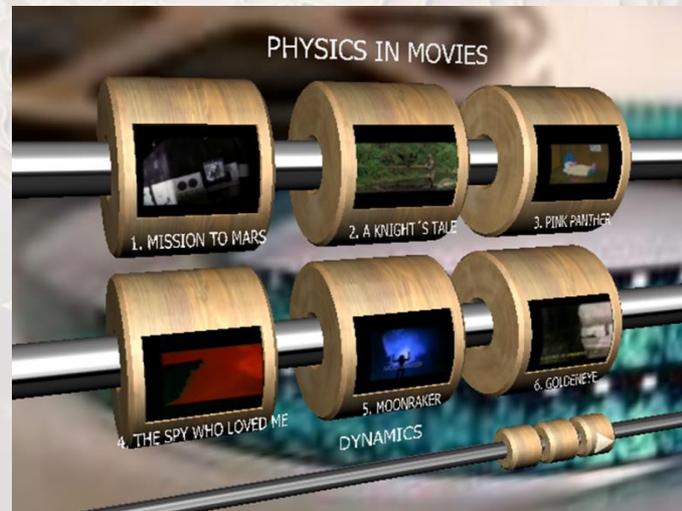
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INTRODUCTION

If we understand how the brain works we can improve the teaching methods. Some authors have proposed a theoretical brain based framework for research in Physics education [1]. The Brain-Based Teaching Approach (BBTA) developed by Reyes [2] is based on similar principles.



METHODS

By using a BBTA method, we prepared 5 sessions to teach Newtonian laws to 15-18 years old students. The motivation was measured with AMS test, specially the dimension intrinsic motivation to know (IMTK) [3], which indicates the pleasure of learning. Two samples with the same N (69) were compared: a BBTA method group and a classic method group.

Session 1: Falling in Aristotle principle and discovering Newton's laws by watching a scene from the film Mission to Mars (00:49:30 to 00:53:30 approx) in a maieutic dialogue. (Fig. 1)

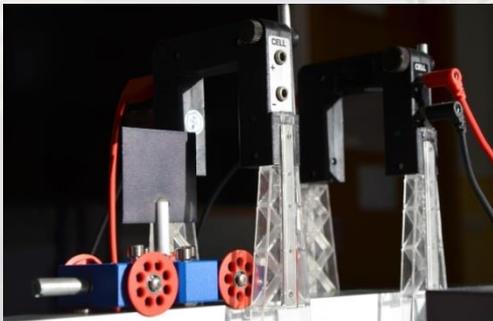
Session 2: From classical exercises to CSI contextualized problems.

Session 3: Lab session. Measuring forces and accelerations. Explaining errors, significant figures, statistics...

Session 4: Self-assessment test, not taken into account for a final evaluation. No pressure for marks. Metacognition.

Students can search for new scenes. They can show and explain their findings in class and can create their own problems by using a movie scene or inventing fictionalized situations. Some of the students exercises would be used as an exam problem.

Session 5: The students go to skate on ice and test through a set of activities the principles already found.



- 11700N
- 11700N
- 76518N
- 88140N



RESULTS

Table 1. Kurtosis-Symmetry (K-S) and Shapiro-Wilk (S-W) normality tests (p-values) of women samples. T-test (parametric)

	BBTA method		Classic method		T test
	K-S	S-W	K-S	S-W	
IMTK	.142	.092	.077	.368	.032

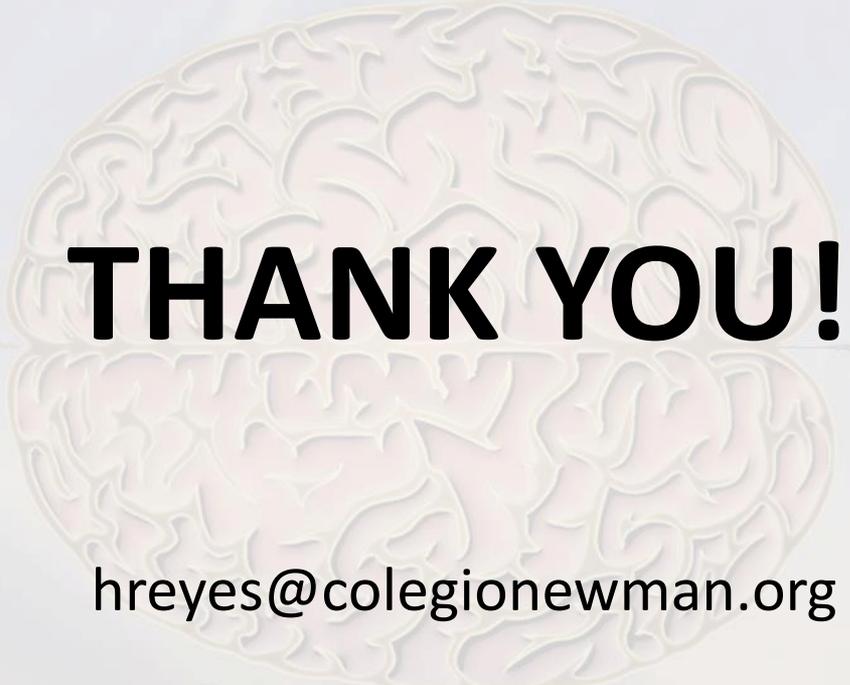
CONCLUSIONS

In light of the results obtained, the BBTA seems to be a very efficient way of teaching and learning Physics. Among the profits, the students have more interest in learning, specially women, and higher reasoning skills.



REFERENCES

- [1] Caine, R., & Caine, G. (2003). 12 Brain/mind learning principles in action. The fieldbook for making connections, teaching and the human brain. Corwin Press.
- [2] Reyes, H., García, J. M., Mirón, J. A. (2021). European Journal of Education and Psychology; Vol. 14 No. 1: January-June 2021; 1-18.
<https://doi.org/10.32457/ejep.v14i1.1550>
- [3] Vallerand, R., Pelletier, L., Blais, M., Briere, N., Senecal, C., & Vallieres, E. (1992). The Academic Motivation Scale: A Measure of Intrinsic, Extrinsic, and Amotivation in Education. Educational And Psychological Measurement, 52(4), 1003-1017. <https://doi.org/10.1177/0013164492052004025>



THANK YOU!

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